Micrographics

Introduction

Microfilming can be a reliable, cost effective means of managing information resources. Briefly stated, microfilming involves the recording of microimages, or miniaturized documents, on photographic film. Microfilm can be used in a variety of information management systems, from simple records storage and retrieval applications to complex configurations involving computer output microfilming.

In New Jersey, microfilm is accepted as a legal substitute for original paper documentation (N.J.S.A. 47:3 et seq.). Consequently, most categories of paper records can be destroyed after microfilming in accordance with required procedures. It must be stressed, however, that the legal acceptance of a microfilmed record depends upon adherence to the statewide microfilm standards published and monitored by the Division of Archives and Records Management (see Appendix A). These standards address the legal certification of microfilm, quality control and archival requirements. Technical, economic and administrative factors must also be considered before implementing a microfilm system.

Objectives of a Micrographics System

Micrographics systems are designed to provide for effective, economical management of records through achieving one or a combination of the following general benefits:

1. **Space Savings** — Document storage space requirements can be reduced by as much as 98 percent with the use of microfilm. This can free valuable office space for more productive uses and help reduce filing equipment expenditures, provided that no viable and cost-effective alternative is available.

2. **File Integrity** — Because microfilmed documents are fixed in sequence, misfiling and loss of individual documents is greatly reduced. When combined with manual or automated index systems, microfilm applications offer one of the best means for effectively maintaining file arrangement and order.

3. **Security** — Microfilm can be duplicated inexpensively. This allows for the low cost retention of security copies of important or vital records at an off-site location. If the original copies of sensitive records are lost or destroyed, duplicates can be made from security film. Moreover, because the documents are placed on film, tampering can be detected more easily.

4. **Quick and Effective Retrieval** — Microfilm generally provides quicker, more accurate access and retrieval of documents than bulky paper-based systems. This is true even for the most basic microfilm formats. When combined with computer technology, microfilm forms the basis for a sophisticated image retrieval system which provides access to individual documents within seconds. Microfilm reader-printers also allow the production of full-size paper copies of microimages when needed.

5. **Preservation** — Documents that have historical or long-term retention value are often too fragile for daily use. The filming of older, deteriorating documents provides a means of generating durable working copies for researchers as well as archival master copies for permanent storage. This eliminates excessive handling of the original documents and helps prevent further deterioration.

Converting recorded information from paper to microfilm can be an extremely effective means of managing records. However, serious difficulties can arise if a micrographics system is chosen and implemented without general awareness of the technology and without a basic understanding of the records system being served.

The Bureau of Micrographics and Alternative Records Storage publishes technical filming specifications, approves microimaging systems, and oversees compliance with production standards. The bureau responds to requests for guidance in purchasing, contracting and managing microfilm and computer systems. The bureau also assists agencies in determining the feasibility of alternative and supplemental image processing systems including Computer Assisted Retrieval (CAR), Computer Output Microfilm (COM), and Laser Optical Disk.

All consultative services are provided to public agencies without charge, however, actual film production is provided at cost. The bureau provides film production and storage services for state, county and municipal agencies and authorities. Every effort is made to accommodate local government filming needs on a contractual basis.

General Issues

Choice of records for microfilming

Consideration must be given to the choice of records for microfilming. From a technical perspective, county agencies and authorities should be aware that such factors as document size, texture, color and condition determine appropriate film format, size and camera type. Different levels of updating and retrieval activity also impact upon decisions regarding format, sequence, retrieval systems and reproduction equipment.

From an economic viewpoint, it is important to note that conversion of paper records to microfilm can be expensive, especially without proper analysis and planning. System maintenance involves costs as well. Procedurally, the use of microfilm often requires development of guidelines for access and duplication. All of these factors must be considered in relation to the documents designated for filming.

Before choosing records to be microfilmed, counties must evaluate their records systems to identify current problems and discover appropriate solutions. Records management principles must be emphasized in this process. As a general guideline, records with retention periods of seven years or longer may be considered for microfilming. Records that accumulate in large volumes, presenting space or filing difficulties are also viable choices. Additionally, vital records and historical documents are appropriate for filming because of preservation and security considerations.

Before filming is undertaken, officials should examine alternatives to determine whether workable, economic records management options are available. For instance, authorized disposal of old record accumulations may be possible simply by using current records retention schedules and submitting destruction request (see II-4). In some cases, records retention schedules may be modified to reduce unduly long records retention periods. Revised filing procedures or diligent use of semicurrent records storage may remedy records access and storage difficulties (see sections III & VI), thereby avoiding the need for microfilming.

Film Formats

There are two basic film formats, or microforms, available for microfilm applications: roll film — reels, cassettes, cartridges; and unitized film — microfiche, microfilm jackets, and aperture cards. Choice of a film format depends upon the characteristics of the paper records being filmed and the nature of the records system itself.

1. **Roll Film** — is a common format in which images are recorded in a fixed sequence along the length of a microfilm roll. The fixed sequential recording method reduces misfiles of individual documents. Also, roll film can be encoded with retrieval marks or blips, which allow automated retrieval devices to locate image frames within seconds. Thus roll film is most effective in large, centralized retrieval systems that require a minimum of updating. Conversely, active records systems that require frequent updates and additions may not be suitable for conversion to the roll format.

    a. **Microfilm Reels** — are available in 16mm and 35mm widths. Filming of standard office documents is usually done on 16mm film, while 35mm film is generally used for drawings, maps and oversized documents. Access time to documents using microfilm reels alone is relatively slow. This is due to the sequential arrangement noted above.

    b. **Microfilm Cassettes and Cartridges** — are used in conjunction with mechanized and automated retrieval devices. Cassettes feature a reel to reel arrangement, while cartridges have a single core. Both devices serve as protective coverings for reels and facilitate image retrieval. A related item is the standardized magazine developed by the American National Standards Institute (ANSI). These removable magazines can be used with all 16mm reels and with a number of different mechanized and automated retrieval devices. This interchangeability can be very helpful in a multi-vendor environment.

2. **Unitized Film** — is produced in a flat format, and replicates discrete file units. This allows for easy updating. However, unitized microforms may be misplaced more easily than roll film.

Therefore, file maintenance may become difficult in large systems. Also, the production of unitized formats is generally more labor-intensive and can be more expensive than roll film production, especially in the filming of paper records.

a. **Microfiche** — is a 4"x 6" film sheet. Images in this format are recorded in frames in a grid pattern. Eye-readable title strips are added to each unit to aid in retrieval activities. Microfiche is particularly effective for systems that require high volume microform duplication and distribution.

b. **Microfilm Jackets** — are transparent plastic carriers which are divided into chambers. Strips of 16mm or 35mm film can be inserted into the chambers. This feature allows for the addition of images as documents are added to a file. The standard 4"x 6" jacket usually contains up to sixty 16mm images. Custom designed jackets can hold both 16mm and 35mm film strips. Microfilm jackets are very effective for active files and can be easily duplicated and distributed. Also, because microimages are placed within the plastic chambers of the jacket, damage to the images from scratching and handling is greatly reduced.

c. **Aperture Cards** — generally contain one 35mm microimage, in a transparent, rectangular window cut in a computer card. Engineering drawings, maps and other oversized documents are usually inserted in the window. Aperture cards that accommodate 16mm strips are also available.

Archival Film and Film Quality

Microfilm that will endure as long or longer than high-grade bond paper is known as archival microfilm. The only film stock that allows for the production of archival microfilm is silver-halide. Film that requires dry chemical processing is not acceptable for any application. However, silver-halide filming alone does not provide archival quality. Proper film processing and storage conditions are equally important to longevity. The American National Standards Institute (ANSI) has specified requisite guidelines for archival film. These criteria are incorporated into the division's statewide microfilm standards.

Consistent film quality is another key factor in successful microfilm systems. The most important qualitative elements are resolution and density. Film resolution relates to the clarity of film images, while density denotes film background contrast. Proper resolution and density ensure readability and high quality duplication. Both of these elements can be measured through procedures and devices developed by the National Bureau of Standards (NBS) and Association for Information and Image Management (AIIM), the professional association for the microfilm industry. Statewide standards follow these national guidelines.

Additional considerations which affect film quality include work place standards. Food, drinks, and

smoking must be prohibited and works areas must be cleaned regularly.

Taking Advantage of Microfilm Systems

Developing a Microfilm Option

County officials should exercise caution when developing a microfilm option. The Bureau of Micrographics and Alternative Records Storage will assist agencies and authorities in determining the feasibility of micrographics or other imaging systems. All consultative services are provided to public agencies without charge, however actual film production is provided on a charge-back basis at cost.

Division analysts and technical experts will help agencies and authorities plan and prepare to ensure that a micrographics option will meet their needs in the most economical and practical manner possible. Current record systems are evaluated and documented, without the bias of needing to make a commission on a sale, so that a clear vision of the function of microfilm within an office's records system may be developed. Ideally, this should be done prior to contacting perspective vendors for equipment and supplies.

Preliminary Activities

The division provides officials with a framework for developing a realistic microfilm option that includes:

1. **User Education** — Preliminary research is necessary to gain a basic understanding of microfilm technology. In addition to the basic information provided by the division, useful material is published by the Association for Information and Image Management (AIIM), and the General Services Administration (GSA).

   The division can be especially helpful because of its knowledge of perspective vendors and frequent contact with public sector microfilm users.

2. **Acquaintance with Statewide Standards** — Compliance with the New Jersey microfilm standards published and monitored by the division is essential to guarantee the viability and legality of microfilm in judicial and administrative proceedings. All microfilm produced by the division is guaranteed to meet these standards.

3. **Acquaintance with Records Destruction Process** — In most cases, paper records may be destroyed after they have been microfilmed providing that authorization procedures are followed (see II-4). The law also requires that a microfilm certification letter be submitted to provide a guarantee that microfilming has been conducted according to minimum quality and documentation standards (see Appendix C). In no instance may records be destroyed

without written authorization.

Current System Review

In order to develop an effective microfilm system design, it is necessary to review the current records system. This will provide county agencies and authorities with the ability to articulate their requirements and compete more effectively for budgetary allocations. In turn, a clear view of benefits and requirements will help reduce misunderstanding regarding the nature and scope of production services contracted from the Bureau of Micrographics and Alternative Records Storage, or the range of goods and services supplied by a vendor. Accurate cost estimates will also be possible. The basic considerations in a current records system review are:

1. **Record Series Description** — The records targeted for filming should be clearly identified and described. The description should include the record series title (see II-I), subject matter (financial records, case files, etc.), retention period, current volume and projected yearly accumulation in cubic feet or linear inches.

2. **Physical Characteristics** — The physical characteristics of the records will impact upon the filming method and film format. Important items include document size, color, type (tissue, bond, carbon, etc.) and condition (torn, frayed, thin, or good condition). It will also be important to list whether the documents are one or two-sided and to note any special storage characteristics (stapled, bound, loose sheets, etc.). If the documents have mixed physical characteristics, the percentage of each characteristic in relation to the total records volume should be determined.

3. **Handling and Maintenance Procedures** — County agencies and authorities should note current procedures for the handling and maintenance of the records to be filed. Knowledge of filing and updating procedures is especially significant, for this information helps to determine the order in which documents will be filmed. An office should document whether an alphabetic, numeric or alpha-numeric file scheme is being used. Procedures for indexing and retrieving the records should also be described. Other important items are updating (add, change or delete), frequency of updating, reproduction and duplication methods, distribution methods and mode of use (reference only or annotation).

4. **Privacy and Confidentiality** — Public records often contain sensitive information regarding individual citizens. Officials must take care to note privacy and confidentiality restrictions, especially when the records are moved off-site for filming.

5. **Problem Statement and Needs Assessment** — The final phase of a current system review entails the development of a summary statement regarding the difficulties involved with the maintenance of the current system and a listing of requirements for the alleviation of these difficulties. The problem statement and needs assessment should be based upon the data generated in the previous system review stages.

   The needs assessment will often aid in the selection of appropriate film formats and equipment for the microfilm system. For example, a records security problem requiring cost-effective off-site storage would indicate a need for a basic roll format with simple, inexpensive

reader devices. An active records system requiring frequent updating and records distribution would indicate a need for a unitized (jacket) format with high volume film duplication facilities.

Microfilm System Specifications

Once a current system review has been completed, technical specifications, or the particular requirements for accomplishing the microfilming of a records system are developed. Factors which need to be considered include:

1. **Film Specifications** — Microfilming in accordance with precise film specification, as routinely done by the Microfilm production unit of the bureau, will help to ensure that counties receive a usable product that meets requirements.

    a. **Film Types** — There are required types for original and duplicate microforms. Only silver-halide film produces archival master negatives. Common copying films are diazo, vesicular and direct-image (silver-based) film. When indicating copy film type, it is important to remember that a number of duplicate microforms may be required. This, of course, affects overall system costs.

    b. **Film Polarity** — Film images may be produced as either negative — i.e., light characters/dark background, or positive — i.e., dark characters/light background. In most cases involving standard office documents, negative polarity is chosen.

    c. **Film Size and Format** — As discussed, the film format (roll or unitized) and film size (16mm, 35mm, 105mm, etc.) is chosen on the basis of the requirements of each specific system.

    d. **Film Image Arrangement and Mode** — There are three image arrangements: simplex, duplex and duo. Simplex is generally used in standard applications where single-sided documents are filmed in a single row. Duplex arrangement allows for the simultaneous recording of two-sided documents on separate portions of the film. Duo arrangement provides for high density storage through the placement of microimages on both the top and bottom portions of a film reel. The two film modes, cine and comic, refer to the position of individual images on a microform.

        In the cine mode, images are viewed from top to bottom along the length of the film. This mode is most often used for oversized documents. Comic mode, which is generally used for standard size documents, allows viewing from top to bottom along the width of the film. The comic mode provides for more economical film use.

    e. **Reduction Ratio** — This is the correspondence of the linear measurement of the original document to the microimage — i.e., 16:1, 24:1, 42:1, 48:1, etc. A reduction ratio of 16:1 therefore indicates that the film image is one-sixteenth the size of the original or source document. As a rule, the 24:1 reduction ratio is specified for standard office documents; the 16:1 ratio is usually designated for drawings or maps. Higher reduction ratios yield greater film image storage per microform. However, higher reduction ratios

may also adversely affect film readability.

f. **Indexing and Labeling** — Individual microimages and microforms are identified through the development of secondary indexes and labeling instructions. Indexing for roll film can be specified in conjunction with a number of finding aids including: flash card targets, line/bar coding, odometer readings, sequential numbering and blip marks. Unitized film can be indexed, through use of notch coding, keypunching, color coding and title strip indexing.

g. **Film Targets** — Statewide standards define required film targets that identify and certify the filmed records. These targeting requirements are routinely included in the production work supplied by the bureau.

2. **Camera Specifications** — In addition to film requirements, the type of microfilm cameras to be used should be also be noted. The three standard camera types are:

a. **Planetary Camera** — This is most commonly an overhead camera unit, with a filming plane and external lighting fixtures. There is, however a planetary camera with internal lights and automatic feed. Filming on a planetary camera is accomplished through the placement of documents on the filming plane and the manual triggering of the filming unit. This camera is preferred for filming archival documents or collections of files with mixed paper characteristics.

b. **Rotary Camera** — These cameras use an automatic filming mode in which documents move through the camera. Imaging and film advance operations are automatically synchronized. Rotary cameras are best suited for documents that are uniform in size and thickness.

c. **Step and Repeat Camera** — A variation of the planetary camera, a step and repeat camera is used for the production of microfiche. Images are produced in a grid-row format. A common application for step and repeat filming is the production of frequently updated, widely distributed reports and publications.

3. **Processing and Quality Control** — Proper control of processing and film quality is essential to the success of the microfilm project; therefore, mandatory requirements in these two areas are established by the statewide standards. Items of particular importance are residual thiosulfate levels and resolution and density measurements.

4. **Using Private Vendors** — There may be mitigating circumstances in which a commercial microfilm service firm may be chosen to provide services that are offered by the division or could be offered in-house. As with any considerations to use a private vendor for any services, county agencies and authorities must examine the long-range costs and budgetary levels, project the rate of growth in their active files and honestly compare the alternatives.

It is important to stress that all microfilming must be done in accordance to statewide standards published and monitored by the division. Microfilm that does not meet standards will not be a legally accepted substitute for paper, and consequently will not be admissible in a court of law (see Appendix A).

General Vendor Responsibilities — If there are sufficient mitigating circumstances to warrant contracting with a private vendor, in addition to having the vendor(s) provide filming, processing and duplicating services, vendors should be responsible for several related areas:

a. **Maintenance of File Integrity** — Provision should be made for protecting and securing the records to be filmed. This is especially important whenever sensitive or confidential information is involved. Specific procedures guaranteeing the safe handling of such records should be included in the system specification.

b. **Documentation** — Any private service company contracted should be required to maintain, for a reasonable period of time, records relating to production and quality control activities for proof that services have been rendered in accordance with specifications.

c. **Turnaround and Records Access Requirements** — Officials have a right to expect timely service. Therefore, turnaround requirements should be specified. Also, if off-site filming is necessary, provisions for authorized access to records at the vendor's premises should be made.

d. **Contingency Plans for Continuous Operations** — County agencies and authorities should require vendors to indicate all contingency plans for continuing production operations in the event of equipment malfunction or other disasters.

e. **Retake Policy** — Vendors should be held responsible for film retakes that result from operator error, substandard film or negligence. A county agency or authority should never be charged for such activity.

It is important to note that the division's Central Microfilm Unit is considered to be one of the most advanced microfilm operations in the United States, and that the resolution of all of the issues discussed above are considered routine business practice.

5. **Further Considerations**

a. **User Equipment and Supplies** — County agencies and authorities should have equipment that is compatible with their specified microfilm system. Reading and retrieval devices are especially important and must be chosen with care. For example, a 16mm roll system that requires paper copies for annotation would require a 16mm roll reader-printer. Finally, supplies for the system, such as paper and toner, should be planned and budgeted for.

b. **Related concerns** — include the availability of user equipment in separable, inter-changeable components or modules. An agency could require both roll and unitized microforms. In such cases, it would be advisable to purchase a reader device that

accommodates both microforms.

Depending upon contract arrangements, vendors can provide appropriate equipment or advise on the basic criteria for purchases. The division also provides advice on equipment purchases.

Summary

Micrographics is an exacting technology that has many appropriate, cost-justifiable uses in the management of county government records. Micrographics provides general advantages of increased space savings, improved file integrity, added security, more efficient retrieval and preservation of highly-referenced, fragile or irreplaceable original documents.

Officials must first take steps to gain control over their records systems thorough implementing basic records management techniques such as records appraisal for transfer of semi-current records and timely disposition of useless records. By having exhausted other appropriate options, officials will be certain that any microfilming conducted will be done because that technique offers the best possible solution to their record-keeping problem.

County agencies and authorities considering conversions to microfilm systems should contact the Bureau of Microfilm and Alternative Records Storage in the Division of Archives and Records Management. The bureau monitors compliance with statewide microfilm standards for New Jersey's public sector. The bureau's Central Microfilm Production Unit also produces microfilm for state, county and municipal agencies on a charge-back basis. Bureau staff is available to meet with officials and visit offices for assessments or advice at no cost.

More information about micrographics is available by calling the Bureau of Micrographics and Alternative Records Storage at (609) 530-3229 or writing: New Jersey Department of State, Division of Archives and Records Management, 2300 Stuyvesant Avenue, CN 307, Trenton, New Jersey 08625.